What is claimed is:

1. A non-destructive method for determining a degree of polish of a metallic substrate, the method comprising:

non-destructively determining a value I_s of infrared energy specularly reflected by a polished surface on a metallic substrate; and

correlating the value I_s of the infrared energy reflected to a degree of polish.

2. The method of Claim 1, further comprising determining a value I_o of infrared energy specularly reflected from a reference polished surface.

3. The method of Claim 2, further comprising comparing I_s with I_o.

4. The method of Claim 1, wherein determining I_s includes utilizing an infrared spectrometer.

5. The method of Claim 4, wherein the infrared spectrometer includes an infrared imaging spectrometer

6. The method of Claim 1, wherein determining I_s includes determining absorbance at at least one wavenumber corresponding with increased infrared absorbance by an unpolished metallic surface.

7. The method of Claim 6, wherein the at least one wavenumber is around 3900 cm-1.

8. The method of Claim 6, wherein correlating the infrared absorbance to a degree of polish of the sample includes deriving a ratio between the infrared absorbance of the substrate at at least two wavenumbers.

9. The method of Claim 8, wherein the at least two wavenumbers are around 3900 cm-1 and around 900 cm-1.

10. The method of Claim 6, wherein correlating the infrared absorbance to a degree of polish of the sample includes deriving a difference between the infrared absorbance of the sample at at least two wavenumbers.

11. The method of Claim 10, wherein the at least two wavenumbers are around 3900 cm-1 and around 900 cm-1.

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12. The method of Claim 1, wherein the metallic substrate includes an aluminum alloy.

13. The method of Claim 12, wherein determining I_s includes determining absorbance at at least one wavenumber corresponding with a peak in an absorbance infrared spectrum of an unpolished aluminum surface.

14. The method of Claim 13, wherein the at least one wavenumber is around 3900 cm-1.

15. The method of Claim 1, wherein the metallic substrate includes a stainless steel alloy.

16. The method of Claim 1, wherein determining a value I_s of infrared energy reflected by a polished surface includes reflecting infrared energy off the polished surface at an angle of incidence less than around 45°.

17. The method of Claim 1, wherein determining a value I_s of infrared energy reflected by a polished surface includes reflecting infrared energy off the polished surface at an angle of incidence of around 15°.

18. The method of Claim 1, wherein a degree of polish includes the smoothness of the metallic substrate.

19. A non-destructive method for determining a degree of polish on a sample, the method comprising:

transmitting an infrared beam onto a sample of a metallic substrate;
detecting a reflected infrared beam reflected by the sample;
determining infrared absorbance of the sample; and
correlating the infrared absorbance to a degree of polish of the sample.

20. The method of Claim 19, wherein determining the infrared absorbance includes using an infrared spectrometer.

21. The method of Claim 19, wherein correlating the infrared absorbance includes determining absorbance at at least one wavenumber corresponding with an infrared spectra of an unpolished metallic surface.

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22. The method of Claim 21, wherein the at least one wavenumber is around 3900 cm-1.

23. The method of Claim 19, wherein the sample includes an aluminum alloy.

24. The method of Claim 23, wherein correlating the infrared absorbance includes determining absorbance at at least one wavenumber corresponding with an infrared spectra of an unpolished aluminum surface.

25. The method of Claim 24, wherein the at least one wavenumber is around 3900 cm-1.

26. The method of Claim 24, wherein correlating the infrared absorbance to a degree of polish of the sample includes deriving a ratio between the infrared absorbance of the sample at at least two wavenumbers.

27. The method of Claim 26, wherein the sample includes an aluminum alloy.

28. The method of Claim 27, wherein deriving a ratio between the infrared absorbance of the sample at at least two wavenumbers includes deriving a ratio between infrared absorbance at around 3900 cm-1 and at around 900 cm-1.

29. The method of Claim 19, wherein transmitting an infrared beam onto a sample includes transmitting the infrared beam at an angle of incidence less than around 45°.

30. The method of Claim 19, wherein transmitting an infrared beam onto a sample includes transmitting the infrared beam at an angle of incidence of around 15°.

31. A non-destructive method for determining a degree of polish of a sample, the method comprising:

transmitting an infrared beam onto a sample of a metallic substrate;

detecting a reflected infrared beam reflected by the sample;

determining a first infrared absorbance of the sample from the reflected infrared beam at a first wavenumber;

determining a second infrared absorbance of the sample from the reflected infrared beam at a second wavenumber;

deriving a first ratio between the first infrared absorbance and the second infrared absorbance; and

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quantitatively determining a degree of polish by correlating the first ratio to a reference sample.

32. The method of Claim 31, wherein correlating the first ratio to a reference sample includes comparing the first ratio with a second ratio of infrared absorbance at the first wavenumber and the second wavenumber for the reference sample.

33. The method of Claim 31, wherein determining at least one of the first infrared absorbance and the second infrared absorbance includes using an infrared spectrometer.

34. The method of Claim 31, wherein correlating the infrared absorbance includes determining absorbance at at least one wavenumber corresponding with an infrared spectra of an unpolished surface.

35. The method of Claim 31, wherein the sample includes an aluminum alloy.

36. The method of Claim 35, wherein the first wavenumber is around 3900 cm-1.

37. The method of Claim 35, wherein the second wavenumber is around 900 cm-1.

38. The method of Claim 31, wherein transmitting an infrared beam onto a sample includes transmitting the infrared beam at an angle of incidence less than around 45°.

39. The method of Claim 31, wherein transmitting an infrared beam onto a sample includes transmitting the infrared beam at an angle of incidence of around 15°.

40. A non-destructive method for determining a degree of polish of an aluminum alloy surface, the method comprising:

transmitting an infrared beam onto an aluminum alloy surface;

detecting a reflected infrared beam reflected by the surface; and

determining a first infrared absorbance of the surface at a wavenumber of around 3900 cm-1.

41. The method of claim 40, further comprising correlating the first infrared absorbance to a degree of polish of the aluminum surface.

42. The method of Claim 40, wherein an infrared spectrometer determines the infrared absorbance.

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43. The method of Claim 40, further comprising determining a second infrared absorbance of the surface at a wavenumber of around 900 cm-1.

44. The method of Claim 43, further comprising deriving a ratio between the first infrared absorbance and the second infrared absorbance.

45. The method of Claim 43, further comprising subtracting the second infrared absorbance from the first infrared absorbance.

46. The method of Claim 40, wherein transmitting an infrared beam onto the aluminum alloy surface includes transmitting the infrared beam at an angle of incidence less than around 45°.

47. The method of Claim 40, wherein transmitting an infrared beam onto the aluminum alloy surface includes transmitting the infrared beam at an angle of incidence of around 15°.

48. A non-destructive method for standardizing a degree of polish of metallic surfaces, the method comprising:

transmitting an infrared beam onto a first metallic surface;
detecting a reflected infrared beam reflected by the first metallic surface;
determining a first infrared absorbance of the first metallic surface;
transmitting an infrared beam onto a second metallic surface;
detecting a reflected infrared beam reflected by the second metallic surface;
determining a second infrared absorbance of the second metallic surface; and
comparing the first infrared absorbance to the second infrared absorbance.

49. The method of Claim 48, further comprising changing the degree of polish of at least one of the first metallic surface and the second metallic surface.

50. The method of Claim 48, further comprising equalizing the first infrared absorbance towards about the second infrared absorbance.

51. The method of Claim 48, wherein the first metallic surface and the second metallic surface include an aluminum alloy.

52. The method of Claim 51, wherein the first metallic surface and the second metallic surface form at least part of an exterior surface of a vehicle.

53. The method of Claim 52, wherein the vehicle includes an aircraft.

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54. The method of Claim 51, further comprising determining a second infrared absorbance of the surface at a wavenumber of around 900 cm-1.

55. The method of Claim 54, further comprising deriving a ratio between the first infrared absorbance and the second infrared absorbance.

56. The method of Claim 48, wherein transmitting an infrared beam onto the aluminum alloy surface includes transmitting the infrared beam at an angle of incidence less than around 45°.

57. The method of Claim 48, wherein transmitting an infrared beam onto the aluminum alloy surface includes transmitting the infrared beam at an angle of incidence of around 15°.

58. The method of Claim 48 wherein the first metallic surface and the second metallic surface form at least part of a building.

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